

**Exercise 1** Perpendicular lines

**Callout.** Remember that two lines in the plane are perpendicular if they intersect at a right-angle, of  $90^\circ$ . Any vertical line is perpendicular to any horizontal line. Two non-vertical lines are perpendicular if and only if their slopes multiply to  $-1$ . That is, if the slope of the first line  $m_1$  and the slope of the second line  $m_2$  have  $m_1 m_2 = -1$ .

- (a) Suppose a line has equation  $y = 3x + 4$ . An equation of the line perpendicular to this line, with  $y$ -intercept at  $(0, -2)$  is given in slope-intercept form by  $y = \boxed{-1/3}x + \boxed{-2}$ .
  - (b) Suppose a line has equation  $x = -2$ . An equation of the line perpendicular to this, which passes through the point  $(4, 2)$  has equation  $y = \boxed{2}$ .
  - (c) Suppose a line has equation  $5x + 2y = -4$ . An equation of the line perpendicular to this, which passes through the point  $(2, -3)$  is given in point-slope form by  $y - \boxed{-3} = \boxed{2/5}(x - \boxed{2})$ .
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